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Investigation of the Current Activity of Three Insect Species Causing Damage to Spruce in Northwest Oregon

The following examinations were made September 19 and 20, 1951, by the writer to check reports of current damage to Sitka spruce stands along the northwestern Oregon Coast. Reports of damage were received from foresters of Crown-Zellerbach Corporation at Seaside and from Oregon State Board of Forestry observers conducting aerial surveys in this region. In addition to these current reports it was desired to check the status of the sitka spruce weevil (Pissodes sitchensis) population that has been followed for several seasons in this area by the Portland laboratory.

Assistance on this work was obtained from Don Baisinger, Research Forester for Crown-Zellerbach, located at Portland and from Everett Wycoff, resident forester for Crown's Clatsop County Tree Farm, with headquarters at Seaside.

Three species of insects were found to be causing damage to spruce in the area: (1) An unknown bud or tip-moth (possibly Zeirephera ratzeburgiana) (2) the Sitka spruce aphid (Aphis abietina) and (3) the Sitka spruce weevil (Pissodes sitchensis.) The damage bing caused by these three insects is described in the following paragraphs.

Defoliation by the Larvae of a Tip or Bud Moth. Spruce stands attacked by this unknown insect, first noted in 1950, are readily found throughout the spruce-hemlock type in all areas examined from 25 miles east of Astoria to the vicinity of Cascade Head Experimental Forest some 100 miles down the coast. Damage was found to be especially heavy along highway 101 between Seaside and Cannon Beach, with many of the trees along the Tillamook Head summit having nearly 100 percent of the current growth attacked. As yet, no permanent damage to the trees could be noted, although the crowns of the trees appeared brownish from a distance at the time of the inspection, even though a large percentage of the currently killed needles have dropped.

There is no certainty as to what insect is causing the defoliation, although the type of damage closely resembles that of an introduced pest, the spruce bud moth (Zeirophera ratzeburgiana) described in Keen's bulletin 273. Damage is obviously caused by small lepidopterous larvae that enter the expanding buds in early spring. The larvae apparently feed singly inside the buds throughout the larval stage; the severed and mined needles, as well as the unshed bud caps are webbed into ball-like structures that are brown in color this time of the season. Except for two small pupal cases and a small

lepidopterous larva that was probably a chance-inhabitor of a webbed bud no evidence of the insect causing the damage could be located. It appeared that feeding had been completed for some time and it could not be determined where or in what stage the insect is found at this season. The miscellaneous specimens found will be submitted for identification; however little assurance as to whether these are secondary species will not be positively known until an examination is made next spring when the defoliation is actually in progress.

Although defoliation is heaviest in natural stands along the coast, some feeding by this insect was also noted in pure spruce plantations in the upper Young's River area. With the presence of approximately 8,000 acres of unbroken host material in this area, the situation will bear close watching.

Defoliation by the Spruce Aphid. When approaching the coast from Portland on state highway 2, defoliation by the aphid is first encountered about three miles east of Seaside. Serious defoliation is found throughout the Seaside area, where spruce around residences and in the city park is very heavily defoliated. As with the bud moth no evidence of the insect itself, other than a few dead specimens stuck to needles, can be found at this time of the year.

It seems doubtful that many of the trees can stand another year of defoliation at the 1951 intensity. Residents of Seaside have consulted Crown's foresters on a means of control. As many of the trees are 50 to 100 feet or more in height, treatment from the ground would very likely not be practicable in a majority of the cases. E. Wycoff informed the writer that a move was also underway to apply aerial sprays. It would seem advisable to investigate the situation next spring, and if needed, provide advice for controlling the outbreak. If mortality to the spruce occurs it would be well to be on record as having recognized the seriousness of the situation and made the proper recommendations.

Wycoff further reported that heavy defoliation, apparently by this insect, was noted along highway 101 in Washington from the Columbia River to Raymond. He was of the opinion that some mortality had occurred. Additional heavy to moderate defoliation was noted in Oregon along the state highway from Astoria to Jewel, in the vicinity of Cannon Beach, and farther south along the coastal highway near the town of Neskowin. Evidence of light defoliation was found intermittently all along the immediate coastal fog belt bordering coast highway 101 from Astoria to Ocean Lake.

In a majority of the cases the previously described bud moth is working in conjunction with the aphid, resulting in defoliation of both the new and old growth needles.

Weeviling of Sitka Spruce by the Sitka Spruce Weevil. Abbreviated examinations of Sitka spruce stands being attacked by the weevil (Pissodes sitchensis) have been made annually in Clatsop County plantations and natural stands along the coast since 1948. Most of the observations have been made with foresters of Crown-Zellerbach Corporation who have planted large areas of burned and cut-over lands to this species. Considerable research has been done by the company on growth and yield of spruce as compared with hemlock. Continued attacks by the weevil, especially in plantations, are causing the foresters to lean more strongly toward hemlock as the tree species to propagate in these areas. However, before discontinuing the planting of spruce, the company has initiated studies to more fully evaluate the damage done by the weevil and plans to establish additional study plots this coming winter.

Examination of 5- to 8-year-old natural stands near Tillamook Head disclosed a decided falling off of attacks in 1951 as compared with 1950. This area is within two miles of the Coast in the low elevation fog belt and appears to be much less susceptible to the weevil in general, and in some years, such as 1951, the trees escape attack almost completely, perhaps due to heavy fog at the time of egg deposition by the adult weevil in the spring. In order to follow more closely the progress of weeviling in these stands, plans were made with Wycoff and Baisinger to establish twenty 1/20 acre permanent study plots this fall or winter. The plots will be established by Crown's foresters with whatever assistance the Portland laboratory can give them on data to be taken and field work.

The Young's River plantations, which consist of some 8,000 acres of planted spruce and volunteer hemlock established from 1927 to 1933 and located some twenty miles from the coast, were also examined. Current weevil attacks here, although still very common, appear to be somewhat less than in any year since 1948. No reason for this decline is apparent, unless the trees are reaching the age where they are declining in susceptibility due to age and height. Although it is very difficult to find a spruce that has not been weeviled at least once in its lifetime, the stand in general has recovered very well from the attacks and obviously has suffered no serious damage. It is apparent, nevertheless, that the younger volunteer hemlock are rapidly approaching the spruce in height, perhaps due to suppression of the latter by the weevil, and in many instances are overtopping it.

Growth studies were established in the plantation areas in 1948 in the form of twenty permanent 1/40 acre circular tagged-tree plots. With the guidance of our laboratory, Crown's foresters propose to use these plots to also obtain data on the incidence of and damage by the weevil. A preliminary outline was made with Wycoff and Baisinger on the type of information that should be taken. The plots are scheduled for growth remeasurement this winter; the weevil data will be recorded at the same time.

After leaving the Clatsop area, observations on the incidence of weeviling were made along the Oregon Coast as far south as Cascade Head Experimental Forest near the town of Otis. Attacks are very common to open-grown trees along roads but are much less frequent in closed- and mixed-species stands. An attempt was made to contact foresters at Cascade Head who had reported damage to Sitka spruce seeded in 1937 on the experimental forest, but all personnel were busy on a forest fire. Having no affinity for this type of work, the writer made a short reconnaissance of the forest alone. Weeviling was noted in many areas but no instances of damage as heavy as in the Young's River region were found. As time permits, it is planned to contact Bob Ruth, in charge of the experimental forest, and arrange for a more thorough examination of the planted area reported to be suffering heavy damage.